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Remarks

Affirmation of the election of claims 1-4, 6-26, 31-32 and 40-47 and withdrawal of claims 5, 27-30-33-39 and 48-59 is affirmed. Claims 60 and 61 and 63-67 have been added and are directed to the elected species of threshold voltage shift prognostic cell of Figure 13 represented in original 31-32. Claim 63 is directed to previously withdrawn species of a field oxide leakage cell but is dependent on allowed generic claim 19.

Applicant's attorney Eric Gifford conducted a telephonic interview with Examiners Arleen Vazquez and Ha Nguyen on April 18, 2007 to discuss the rejection of claim 1, and specifically the difference between the claimed invention and Okandan. The parties agreed that the claims as previously presented define patentable subject matter over the cited art. Examiner Vazquez indicated that she would need to conduct an update search before allowing the claims.

35 USC § 112 Rejections

Claims 1, 15, 40 and 45 were rejected as the term "a prognostic distance" was unclear. Claims 1, 40 and 45 have been amended to define a "designed trigger time t1" for the prognostic cell and a "possible failure at a time t2" for the useful circuit and "a prognostic distance of t2-t1" (See Fig. 5). Claim 15 was not rejected over the cited prior art. Applicant requests that claim 15 as amended and claims 16-18 that depend thereon be indicated as allowed.

Claim 2 was rejected as being unclear because claim 1 stated that a failure indicator will be generated because of the failure of the useful circuit. This is an incorrect

reading of claim 1. The failure of the prognostic cell triggers the generation of the failure indicator.

Claim 7, actually claim 6, was rejected as "enhance measurement sensitivity" was considered unclear. Claim 6 has been amended to recite "more accurately measure the deterioration of the test component".

Claims 12 and 13 was rejected based on the inconsistency of "the reference sub-circuit" and "reference circuit". The claims have been amended to recite only the "reference circuit".

Claims 31 and 32 were objected to for antecedent basis problems. Claim 31 has been amended to specify that the useful circuit component is a MOS device.

Claims 40 and 45 were rejected as the Examiner felt it was unclear which device (circuit or component) is being tested in order to indicate the failure. Within the prognostic cell, the test devices are subjected to an increased operational stress to accelerate deterioration of the devices' stress components. When the stress components fail the prognostic cell generates a failure indicator.

Claim 41 was rejected for proper antecedent basis. Claim 41 has been amended to specify the useful circuit instead of the host device.

Claims 44 and 47 were rejected as it was not clear what a "premature trigger" comprises and how are related "the number of test devices" with "the amount of useful lifetime sacrificed is less than an acceptable amount." These claims have been amended to include the more precise wording found at p. 4, l. 32 to p. 5, l. 10 and p. 13, l. 11 to p. 14, l. 18 of the application. As claims 44 and 47 were not rejected over prior art, Applicant asks that both claims be allowed.

35 USC § 102 Rejections

Claims 1-4, 6-14, 16-18 and 40-43 and 45-46 were rejected under 35 USC 102(b) as being anticipated by Okandan et al. (US 6,348,806).

As shown in Figures 1 and 2, Okandan discloses an IC including a measurement circuit 20, an operating circuit 22, a test enable unit 24 and a device under test 26. In normal operation, the enable unit couples the operating circuit to the device under test to perform some predetermined function. The enable unit decouples the operating circuit and couples the measurement circuit to the device under test to measure its gate leakage current. If the leakage current is sufficiently high, the measurement circuit outputs a quasi-breakdown indicator.

Both Okandan's IC and applicant's IC include a useful circuit (device under test) that is subject to possible failure in response to operational stress. The differences are that Okandan does not provide a separate prognostic cell that is itself designed to fail under operational stress. Okandan measures a property i.e. gate leakage current from the device under test as predictor of that same device's failure. Furthermore, Okandan does not teach placing the prognostic cell under "increased operational stress correlated to the operational stress on the useful circuit". Okandan does not have a separate prognostic cell so he cannot increase its operational stress. Okandan periodically switches out the operating circuit and switches in the measurement circuit to measure the gate leakage current. Lastly, Okandan does not teach designed the prognostic cell to fail by a prognostic distance t_2-t_1 ahead of the failure of the useful circuit. Okandan

measures an increase in leakage current and when it is high enough declares a quasi-breakdown state as an early warning of complete failure. This is not the same as the actual accelerated breakdown of Applicant's prognostic cell triggering the failure indicator.

Dependent claim 2 and independent claims 40 and 45 provide additional structure to the prognostic cell. The cell includes one (or more) test devices each having a test component. Okandan's measurement circuit does not include a test device, Okandan measures the gate leakage current of the actual device under test. The cell also includes a stress circuit that increases the operational stress applied to the test device to accelerate deterioration of the test component. Okandan does not teach any circuit for increasing the operational stress. Because Okandan measures a property of the actual device under test (or useful circuit) he cannot effectively increase the operational stress in the manner. If he applied increased stress to the DUT during normal operation than he would accelerate the failure of the DUT, which is clearly undesirable. If he applied increased stress to the DUT during measurement only than the increased stress would not have the effect of accelerating deterioration of the DUT.

Claims 1-4, 6-14, 16-18 and 40-43 and 45-46 as amended to address the various 112 objections now define patentable subject matter over the prior art of record. Applicant respectfully requests that the Examiner withdraw the rejection and issue a notice of allowance. Applicant respectfully requests that withdrawn claims 5, 27-30, and 33-39 be reinstated as being dependent from generic claim 1.

35 USC § 103 Rejections

Claims 31 and 32 were rejected under 35 USC 103(a) as being unpatentable over Okandan et al. in view of Thomson et al. (US 5,117,113). As claim 31 depends from claim 1, which has been clearly demonstrated to be patentable over the cited, no additional arguments are required. Applicant reserves the right to argue for the independent patentability of these claims.

Allowable Subject Matter

Claims 19-26 were indicated as allowable if rewritten to overcome the rejections under 35 USC 112, 2nd paragraph, set for in the office action and to include all of the limitations of the base claim and any intervening claims. Accordingly, claim 19 has been rewritten in independent form to include all of the limitations of claim 1.

Claims 15 and 44 and 47 were rejected under 35 USC 112 but not over the prior art of record. Applicant believes these claims as amended to address the 112 issues are now allowable.

Additional Claims

Claims 60 and 61 directed to the threshold voltage shift prognostic cell of Figure 13 have been added as dependent from allowed claim 19. Independent claim 62 and dependent claims 63-67 are also directed to the threshold voltage shift prognostic cell and incorporate the limitations of current claim 1. Claim 62 directed to the field oxide leakage cell of Figure 12 has been added as dependent from allowed claim 19.

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Conclusion

The Examiner is invited to call the undersigned at the below listed telephone number if, in the opinion of the Examiner, such a telephone conference would expedite or aid the prosecution and examination of this application.

Respectfully submitted,

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Date: April 18, 2007

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